

Figure 1

# Group Fixed-point Multiply

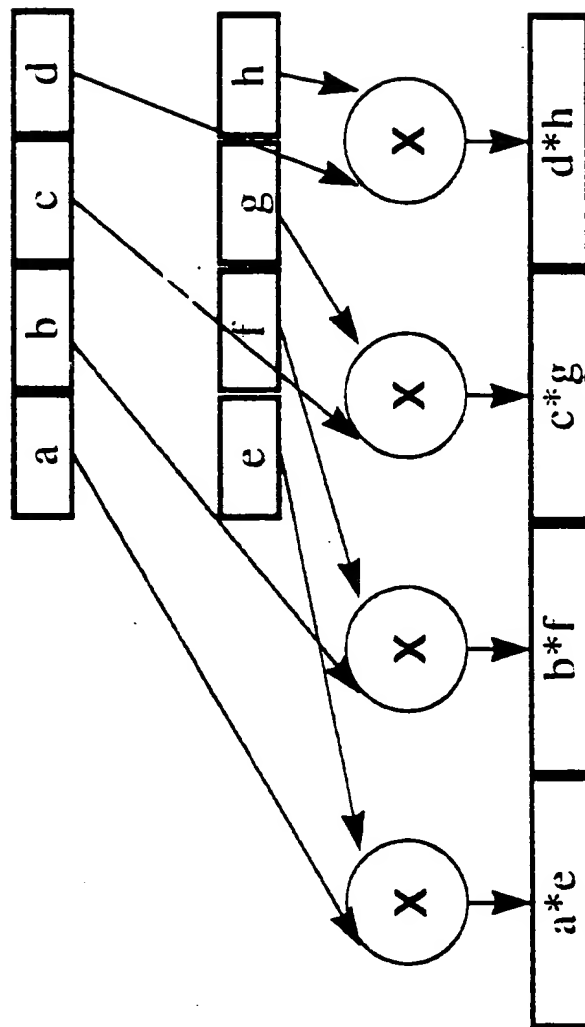


Figure 2

# Group Fixed-point Multiply and Add

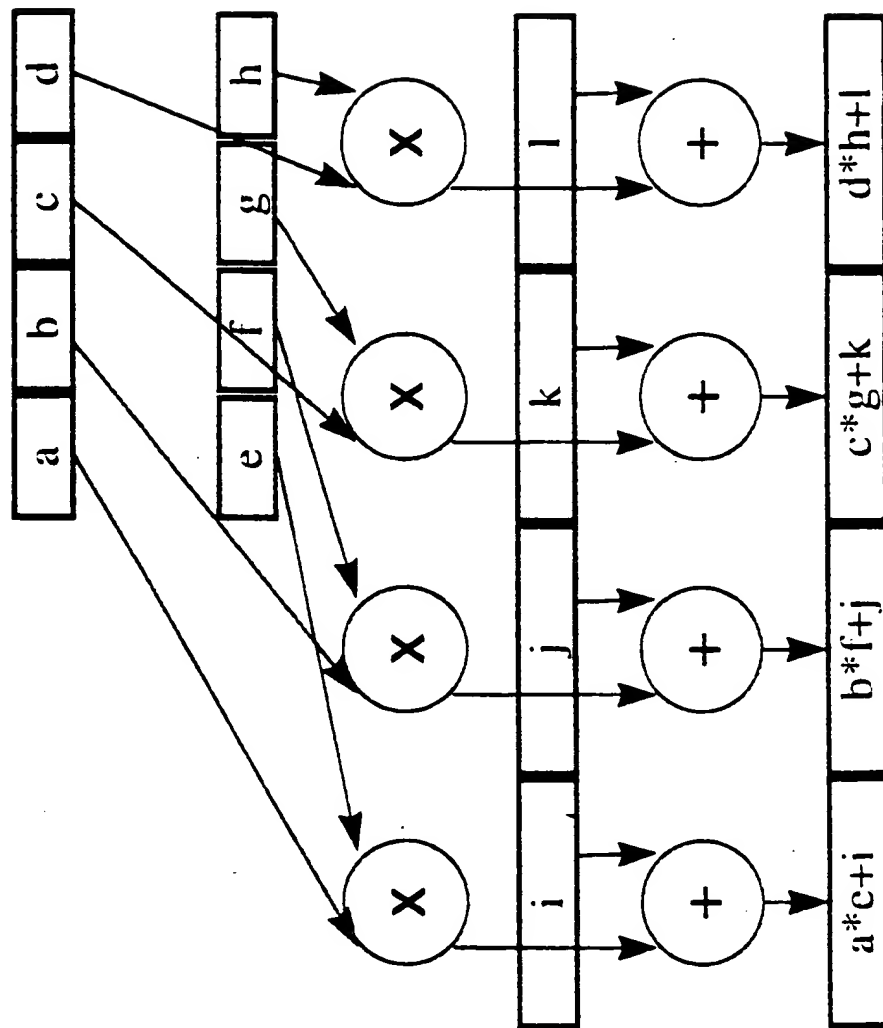


Figure 3

# Group Floating-point Multiply

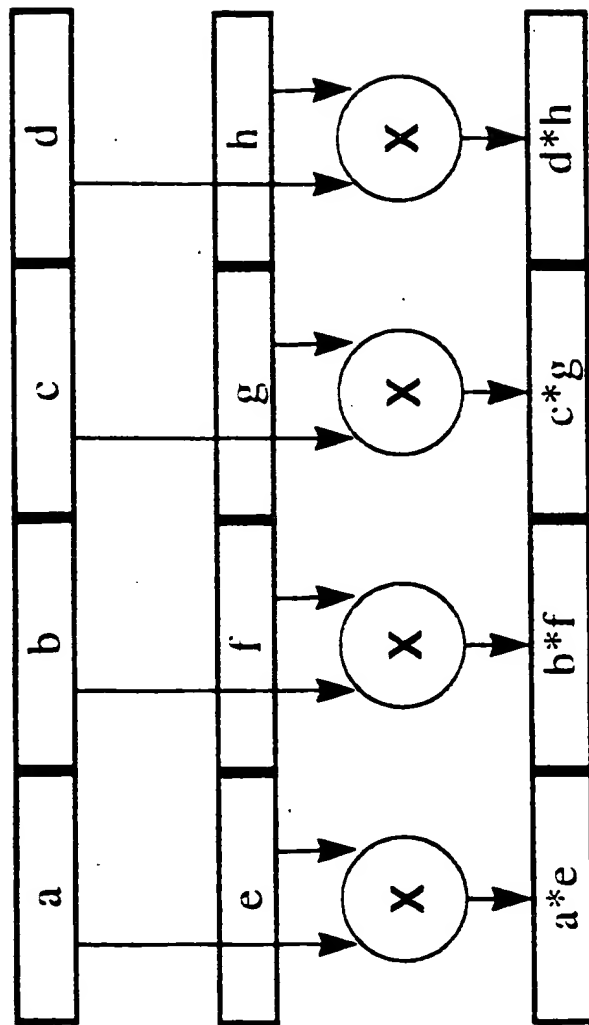


Figure 4

# Group Floating-point Multiply and Add

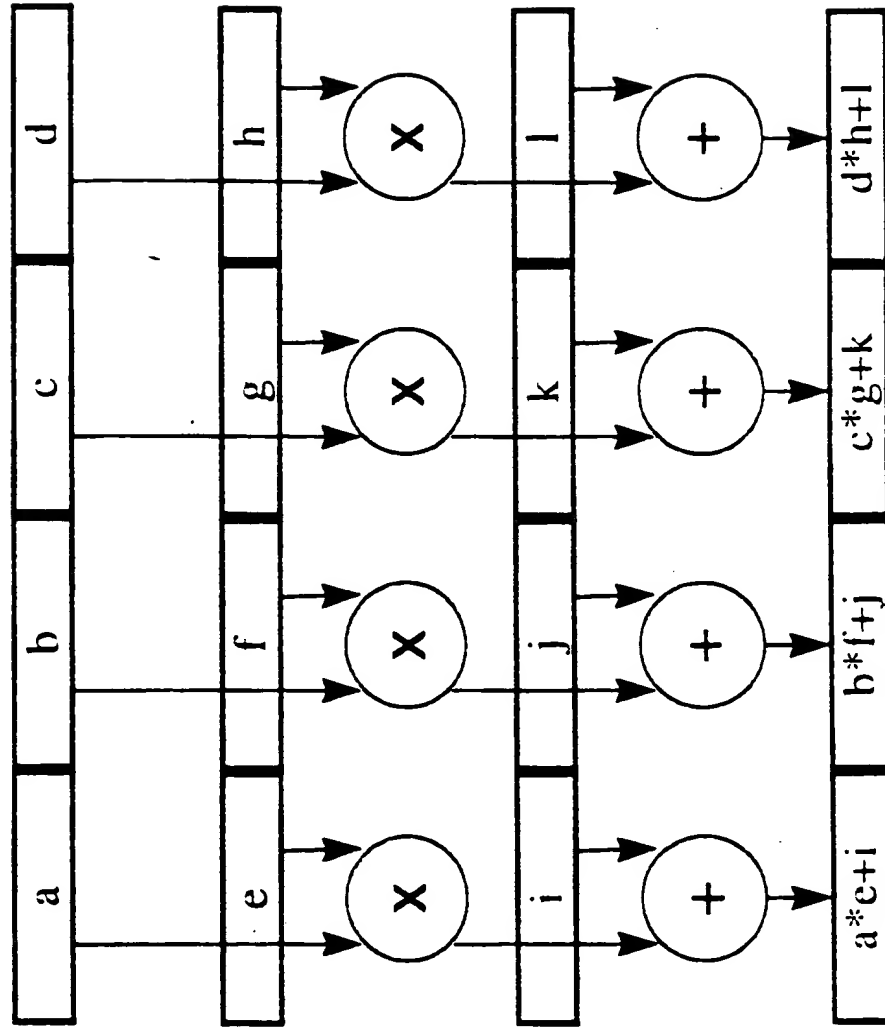


Figure 5 A

# Group Fixed-point Multiply and Sum

- Group Multiply and Sum: 64/128 bits :=  $128 \times 128$  bits
- symbol sizes of 1, 2, 4, 8, 16, 32, 64 bits

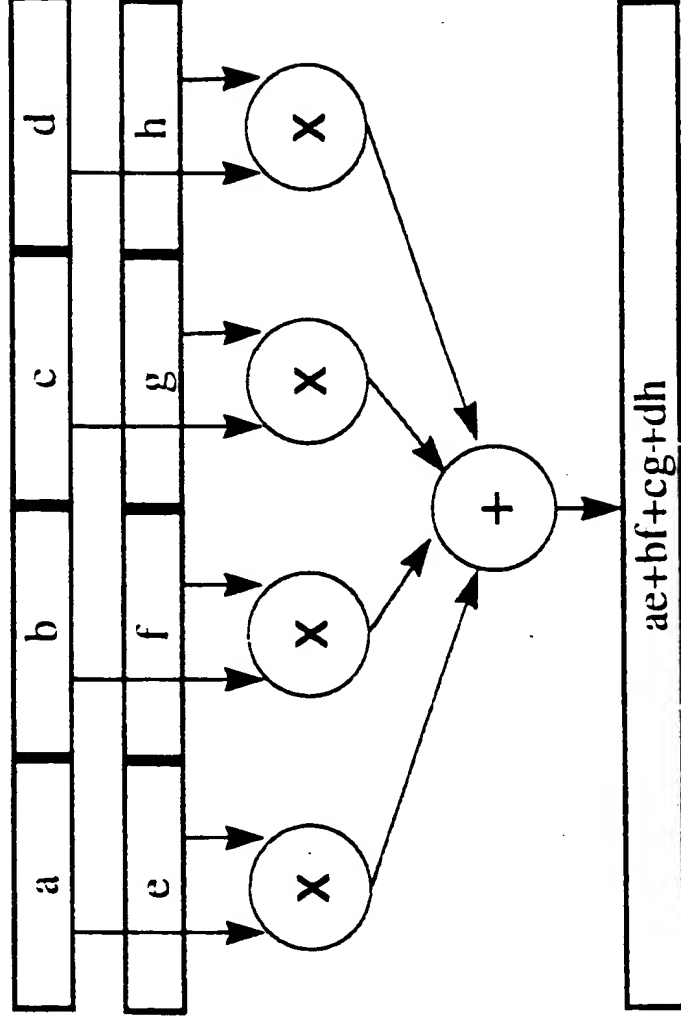


Figure 5 B

# Group Fixed-point Multiply and Sum

- Group Multiply and Sum: 64/128 bits := 128\*128 bits
- symbol sizes of 1, 2, 4, 8, 16, 32, 64 bits

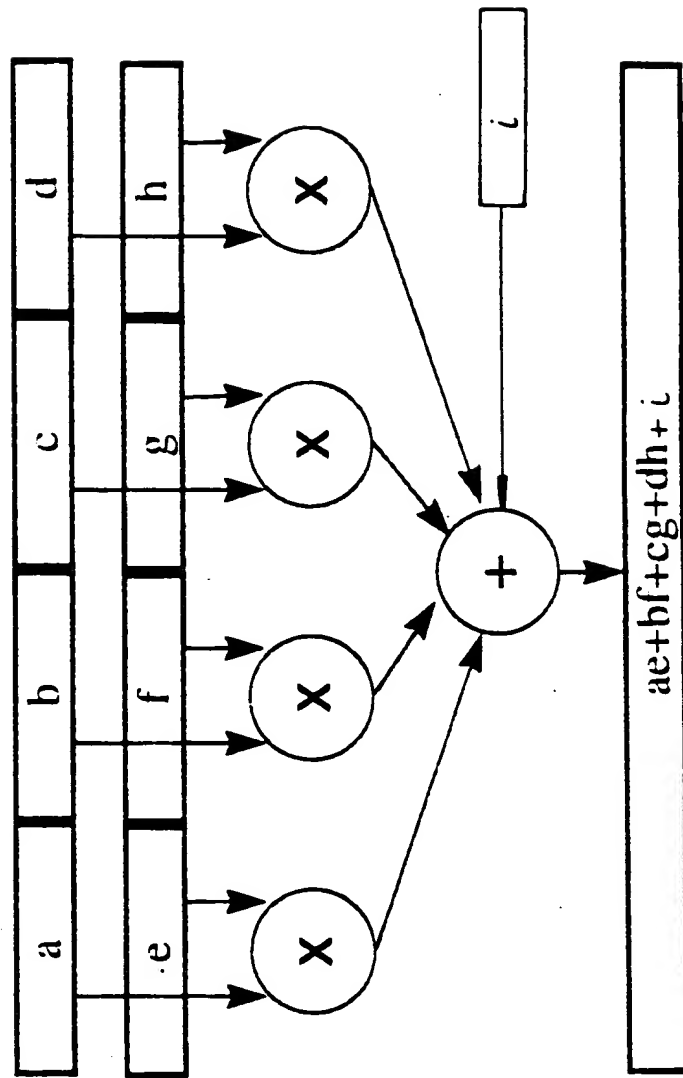


Figure 6

# Group Floating-point Multiply and Sum

- Group Multiply and Sum: 64/128 bits := 128\*128 bits
- symbol sizes of 16, 32, 64 bits

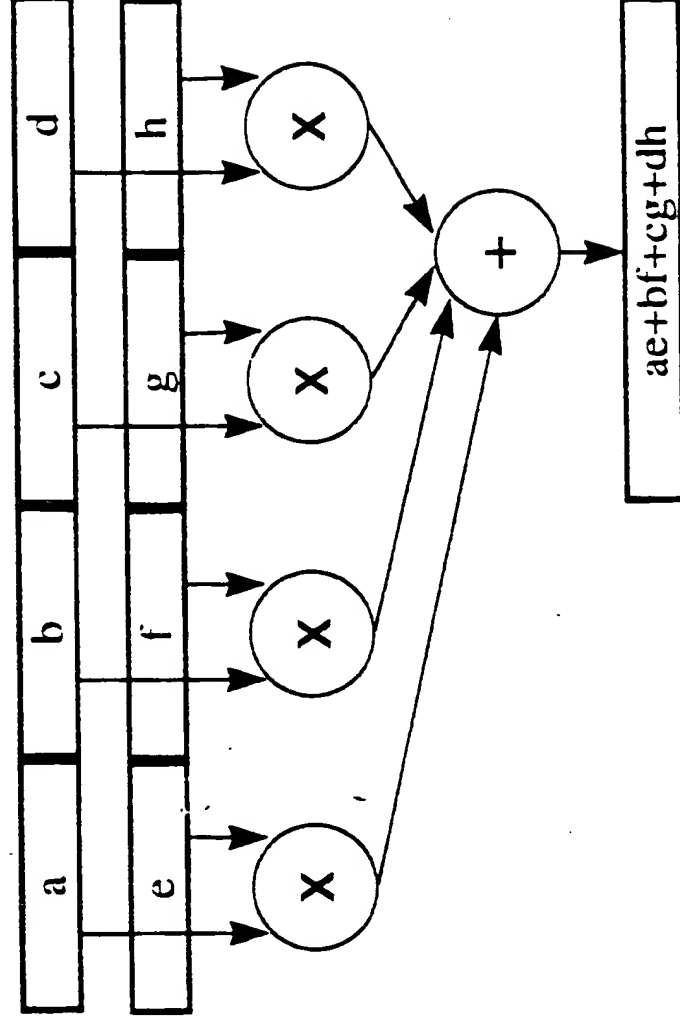
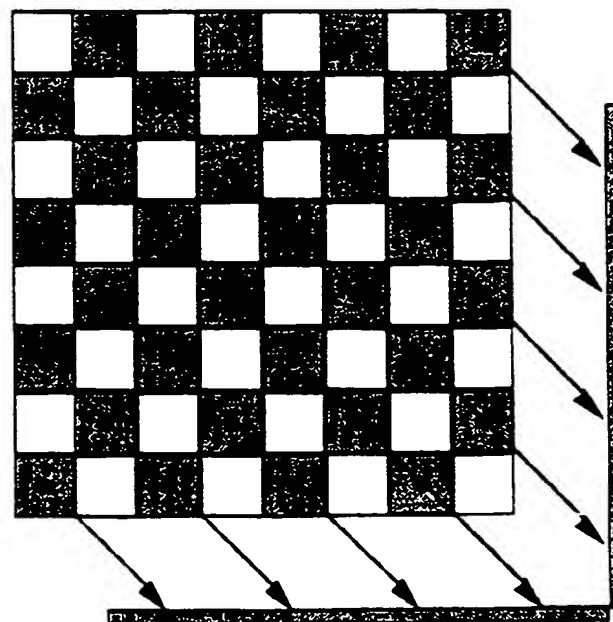


Figure 7

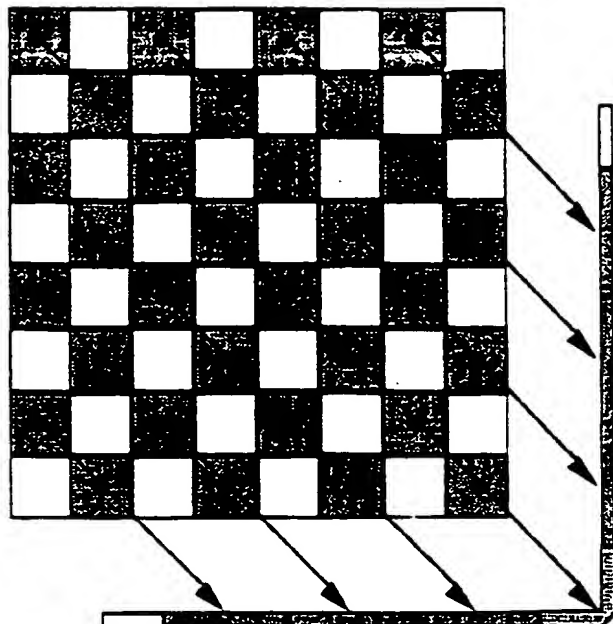
# Group Convolve

- Group Convolve: 128 bits :=  $64 * 64$  bits
- symbol sizes of 1, 2, 4, 8, 16, 32 bits

multiplicand  
(64 bits)



multiplier  
(64 bits)



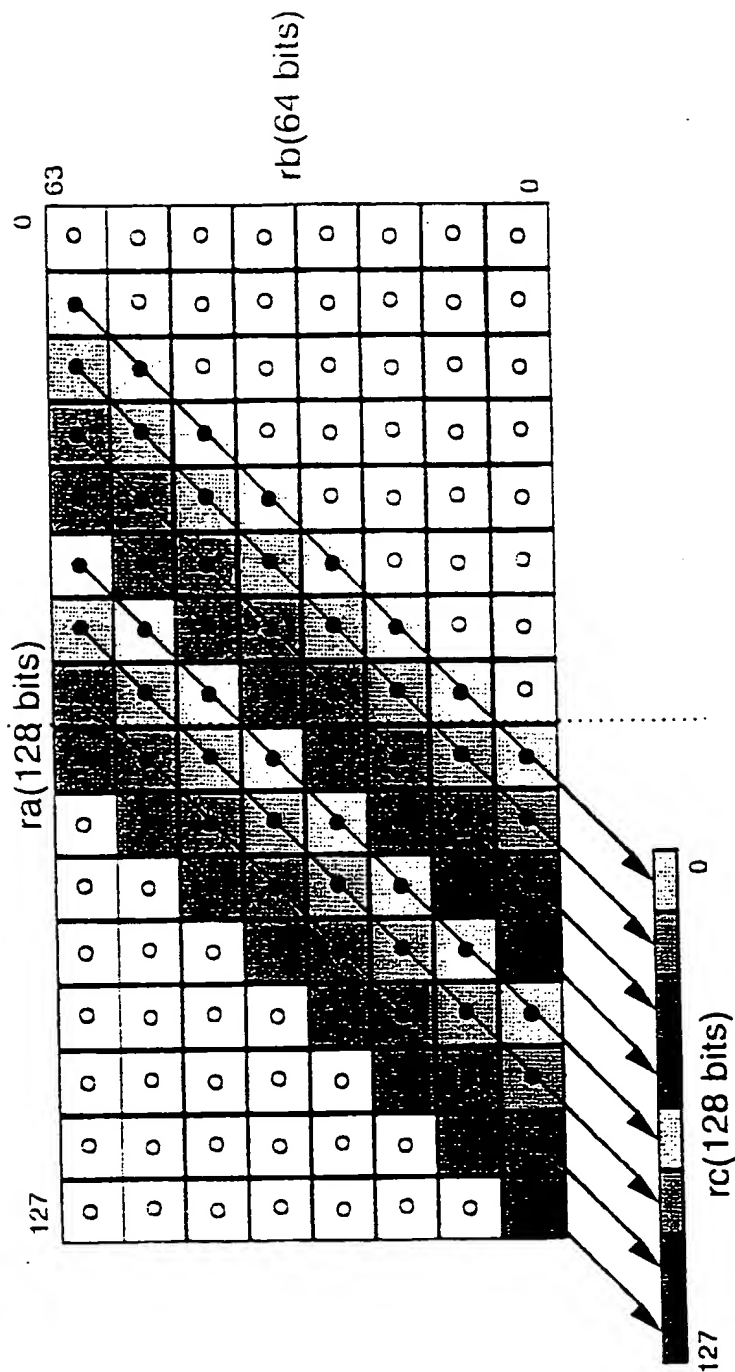
sum of products (128 bits)



Figure 8

# Group Fixed-point Convolve

- Group Convolve: 128 bits :=  $128 * 64$  bits
- sizes of 1, 2, 4, 8, 16, 32 bits
- signed and unsigned



# Group fixed-point convolve

- Group Convolve: 128 bits := 128 \* 64 bits
- symbol size of 16 bits shown

Figure 9

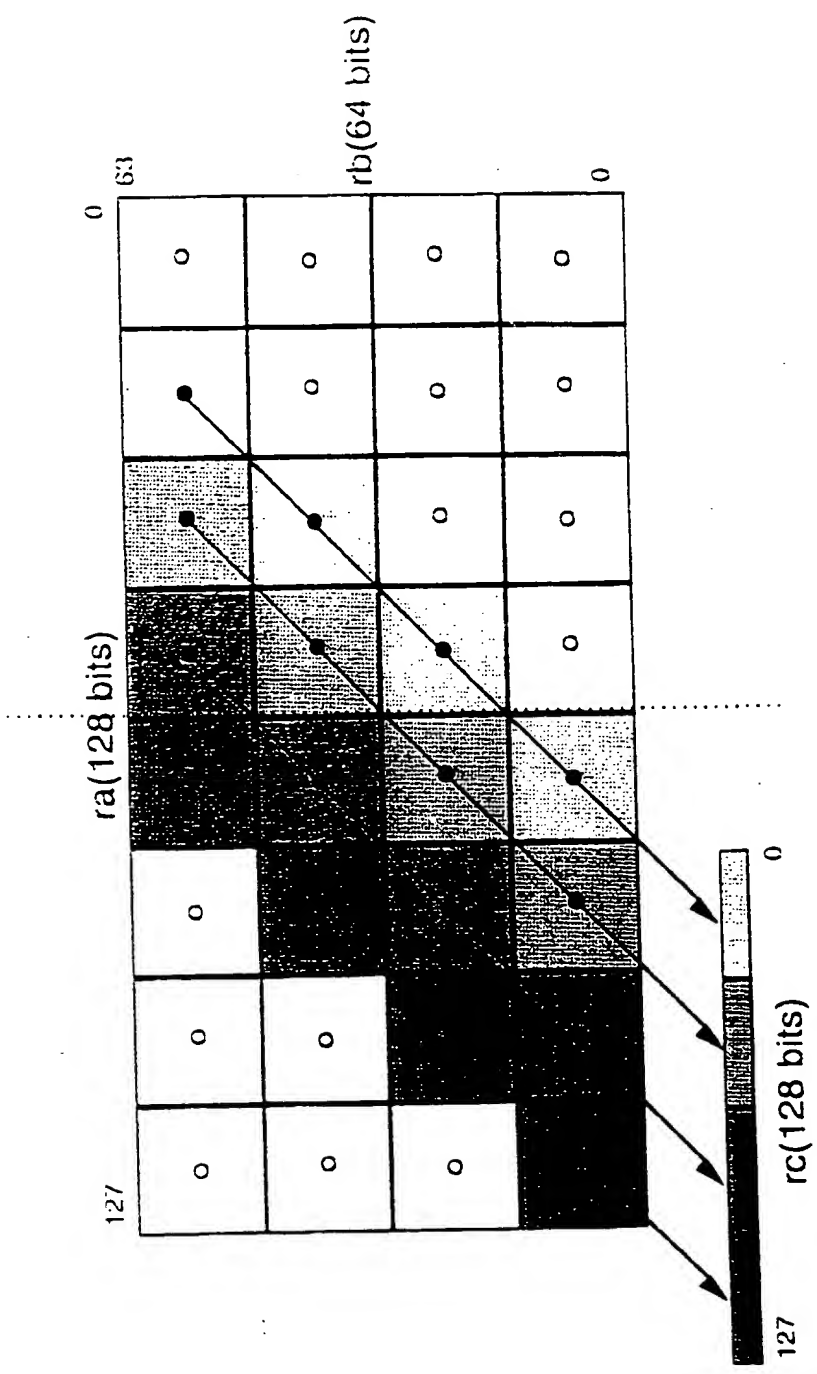


Figure 10

# Group Floating-point convolve

- Group Convolve: 64 bits :=  $128 * 64$  bits
- sizes of 16, 32 bits

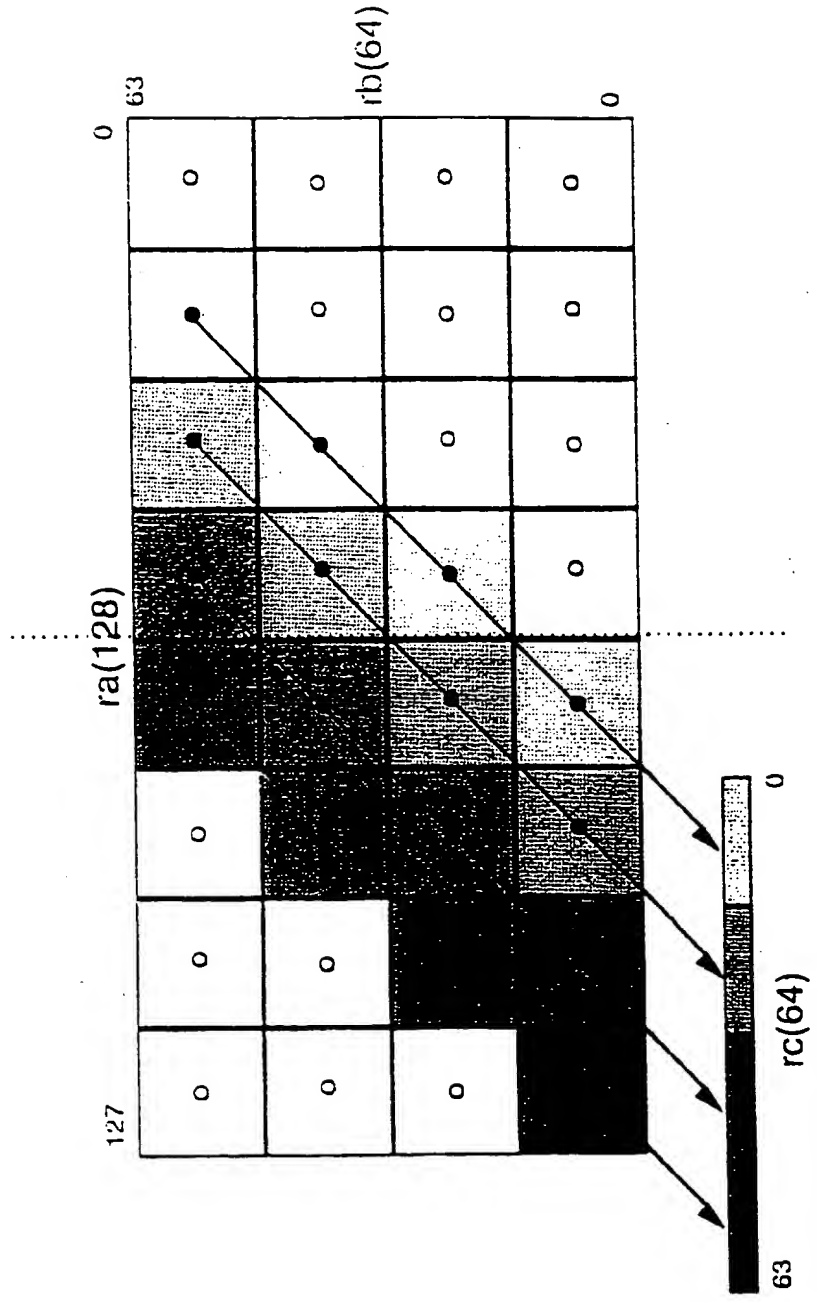
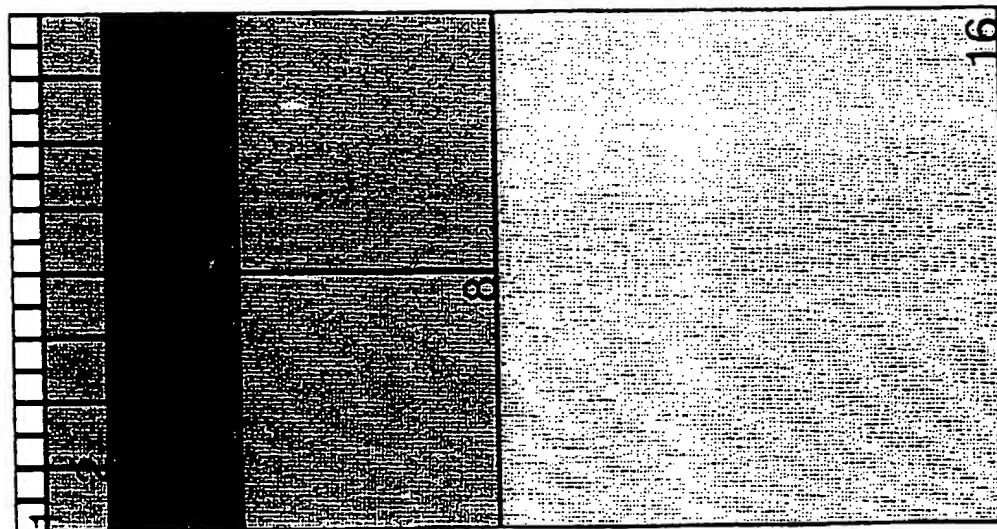
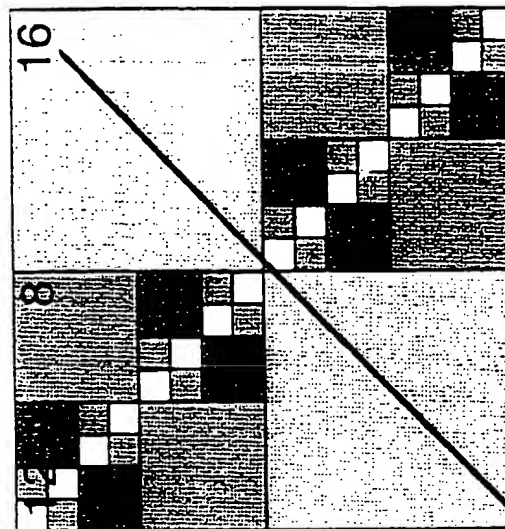


Figure 11

# Group Integer Multiply



multiplicand



multiplier



product accumulation



Figure 12

# Group Multiply-and-sum

